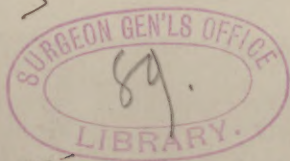


Little (J. L.)

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TREATMENT OF FRACTURES OF THE PATELLA  
BY THE  
PLASTER-OF-PARIS SPLINT.

BY  
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## THE TREATMENT OF FRACTURES OF THE PATELLA BY THE PLASTER-OF-PARIS SPLINT.<sup>1</sup>

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IN presenting this subject to the Society this evening, I wish to describe the method of treating simple transverse fractures of the patella with plaster-of-Paris, which I have used since 1863, and which has never before been described. I am also anxious that it shall serve to draw out a full discussion upon the treatment of this important injury.

The plaster-of-Paris *bandage* has been more frequently used, and the results have not been sufficiently satisfactory to prevent Hamilton from condemning it in these words: "Plaster-of-Paris is, of all the forms of immovable dressings, the worst, because it is the heaviest; but of them all it must be said that they are necessarily cumbrous as a form of portative apparatus; they are, to some extent, dangerous, especially in the hands of inexperienced surgeons; they are inefficient as a means of approximating the fragments; they actually serve but one single purpose, namely, to keep the limbs straight; and this they do too effectually in many cases, causing an unnecessary degree of passive ankylosis. The limb can be maintained in a straight position by a much simpler and lighter dressing than a plaster-of-Paris splint, and by means which permit it to be daily examined and the condition of the fragments noted and corrected, and which will allow slight passive motion occasionally to the knee-joint, a practice which has been found in my experience perfectly safe, and useful in some measure, as far as the ankylosis is concerned. In short, to apply the plaster of Paris, and permit the patient to go about on crutches, as is generally acknowledged by its advocates, is to abandon practically every acknowledged indication of treatment, except straightening the limb and securing immobility at the knee-joint."<sup>2</sup>

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This criticism, from so high an authority, has evidently been drawn out by his observation on the treatment of the fracture in question by the plaster-of-Paris *bandage*. It will, perhaps, be best for me to state at the outset, in order to avoid a misunderstanding, that I always make

<sup>1</sup> Read before the New York Surgical Society, March 11, 1884.

<sup>2</sup> A Practical Treatise on Fractures and Dislocations, by Frank H. Hamilton, 1880, p. 522.

a distinction between the plaster-of-Paris *bandage* and the plaster-of-Paris *splint*; two entirely different methods of using this material. The method which I propose to describe is by the use of the plaster-of-Paris splint, which was first introduced by me in 1861, and first applied to a fracture of the patella, in 1863, in a patient of Dr. Tucker, of this city, and which I have used in all the cases that have come under my care in St. Luke's and St. Vincent's Hospitals, as well as in my private practice.

Immediately after the receipt of the injury, I elevate the limb slightly, and place it on a pillow, or a single inclined plane, and wait until the swelling and inflammatory action which follow have subsided. The limb is placed in this position simply for the comfort of the patient, and not for the purpose of relaxing the quadriceps extensor muscle, and thus preventing the separation of the fragments, which was formerly considered necessary. Although I have often attempted, I have never been able, to demonstrate that it made any appreciable difference in regard to the separation of the fragments whether the limb was in a straight position or the thigh flexed on the pelvis.

Sometimes, when the effusion into the synovial cavity is great, I apply pressure as soon as the patient is able to bear it, by means of a bandage. When the swelling has subsided, which takes from five days to a week, the following dressing is applied: A posterior splint is made of two thicknesses of bleached Canton flannel, strengthened in the middle, under the knee, by two extra layers; this is made long enough to reach from a little above the ankle to above the middle of the thigh, and wide enough to cover two-thirds of the circumference of the limb above and below the joint, but at the joint it should only just cover the condyles of the femur. Two pieces of Canton flannel, of from two and a half to three inches in width, double thickness, one long enough nearly to encircle the limb at the ankle, the other to encircle it at the upper third of the thigh, are prepared at the same time. The pieces designed for the posterior splint are then thoroughly saturated in a mixture of plaster-of-Paris and water, taking care that the mixture is not too thick,<sup>1</sup> and then smoothed out upon a board with the hand, and applied smoothly to the limb. Then the two bands are prepared in the same way and applied around the upper and lower extremities to hold it in position. A dry roller bandage is then firmly applied over all, and the plaster allowed to set.

As soon as this is accomplished the bandage is removed, and we have a firm posterior splint, secured above and below by transverse

<sup>1</sup> Superfine or dental plaster should be obtained. The mixture should be about the consistency of cream.

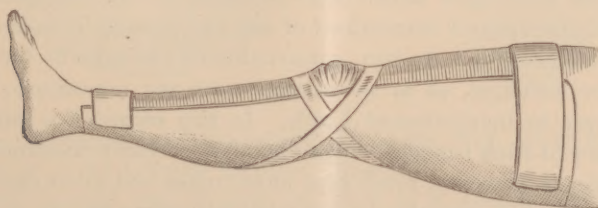
bands.<sup>1</sup> Two other strips, of a double thickness of Canton flannel an inch wide, and long enough to overlap on the posterior surface of the splint, are saturated in a fresh mixture of plaster-of-Paris and then tightly applied above and below the patella, while the fragments are held in position by an assistant, in the same manner as adhesive straps are used for coaptation in this fracture. A dry roller bandage is then rapidly applied with the figure-of-eight turns over the strips. The surgeon then, with thumb and finger of each hand over these coaptation bands, forces the fragments into close approximation,<sup>2</sup> and holds them there until the plaster has set (Fig. 1). The bandage is then removed

FIG. 1.



and a fresh one applied over the whole length of the limb.<sup>3</sup> The dressing is then complete. Fig. 2 shows the splint with the bandage removed.

FIG. 2.



It is a good plan for the surgeon, before applying the coaptation bands, to see that the fragments can be easily approximated. In a number of cases I have found some difficulty in keeping the fragments

<sup>1</sup> Sometimes I apply a third band between the knee and the lower one.

<sup>2</sup> The lower coaptation band holds the lower fragment fixed, and at the same time enables the surgeon to make counter-pressure while he forces the upper fragment in position.

<sup>3</sup> I have sometimes applied a plaster-of-Paris bandage over the splint. This makes a very strong dressing, but it prevents the inspection of the fragments during the course of the treatment, for this reason I prefer the dry muslin bandage.

in the same plane, or in preventing them from tilting, there being a tendency for one to rise above the other. This can be overcome by making pressure with the fingers over the line of fracture while waiting for the bands to harden.

*This dressing differs essentially from all others, in that the fragments are adjusted by the hands of the surgeon, and the "setting" of the plaster keeps them in the exact position in which they were held.*

With this dressing the patient is not compelled to keep his bed, but may sit up or go about on crutches with but little inconvenience.

This apparatus, like all plaster-of-Paris splints, should be applied directly against the skin, care being taken, however, to remove the hair, or else smear the limb with vaseline or oil.

The condition of the fragments can now be examined at any time by simply removing the bandage, and, in case any separation has taken place in consequence of the shrinkage of the limb, it can be corrected by removing the coaptation bands and applying new ones. Care should be taken, if this becomes necessary, which is seldom the case, to moisten the posterior splint in order to insure the adherence of the new pieces.

This overcomes one of the objections urged by Dr. Hamilton—the inefficiency of this dressing as a means of approximating the fragments. Another objection which he makes, in regard to the weight of the splint, is not at all applicable, as patients have never complained of this, and I doubt very much if it weighs any more than the apparatus he recommends.

Pressure sores have never been produced in my experience, nor have the patients ever complained of any pain caused by undue tightness of the dressing. In fact, constriction of the limb by the splint, bands, or bandages, so as to interfere with the circulation, cannot occur, even in inexperienced hands. In this respect it is safer than the plaster-of-Paris bandage which Hamilton so justly condemns.

In order to prevent a rough edge at the upper and lower extremities of the splint, it is advisable to fold them over about half an inch, thus bringing a perfectly smooth edge in contact with the soft parts.

This dressing should be left on for from six to eight weeks. The majority of patients rarely have any appreciable separation of the fragments at the end of the treatment, but as the union is generally ligamentous, a certain amount of separation will take place in time, as in all cases in which there is not bony union.

A case that I treated ten years ago, by this method, came under my notice again a few weeks since; the fragments, which after the treatment were almost in direct contact, I found had separated only a little more than half an inch.

Two cases treated by this apparatus, at St. Vincent's Hospital, resulted in bony union. The first case, a man, about forty years of age, was treated for a transverse fracture of the right patella.

After the apparatus was removed no separation or motion of the fragments could be detected. He remained in the hospital about three months. Six weeks after he left, he was brought back with a severe injury of the head, from which he died. The patella was removed, and was found to have united by bone (Fig. 3). The specimen which I show the Society has been carefully examined, by section, by Prof. W. H. Welch, of Bellevue Hospital Medical College, and he states that it is true bony union (Fig. 4). The line of fracture is slightly oblique, from above downwards and outwards. The lower fragment is somewhat tilted, and overlaps the upper a little; it is also displaced outwards one-quarter of an inch.

FIG. 3.



FIG. 4.



This interesting specimen belongs to the late Prof. James R. Wood's collection in the Bellevue Hospital Museum.

In the second case, treated by Prof. F. S. Dennis, although the patient was eighty-six years of age, no separation or movement of the fragments could be detected when he left the hospital.

In comparing this method with the one of wiring the patella in simple fractures, under antiseptic precautions, which has lately come into vogue, I am inclined to give the preference to the one just described, or to any other form of dressing which results in close ligamentous union. The patient is not submitted to a surgical operation which may endanger his life or the usefulness of his knee-joint, for, with the utmost care in antiseptic measures, there is still the possibility of serious complications. I think all surgeons will agree, that

a moderate amount of separation of the fragments by a ligamentous band, does not in any way interfere with the usefulness of the limb. Hamilton says "that if the ligamentous band is not more than an inch in length, the use of the limb is not impaired." In a case which I presented at one of the meetings of the Society about two years ago, a patient, aged twenty-two, broke his patella transversely below its middle. He was treated by me in St. Luke's Hospital, and was discharged with a ligamentous union of less than half an inch. Six months after, he slipped in walking and fractured the same patella about half an inch above the first fracture; this also united by ligament. In this case the ligament proved itself stronger than the original bone.

If, then, ligamentous union of a moderate length does not impair the usefulness of the limb and is as strong, if not stronger, than the original bone, why should we submit the patient to any serious danger, in order to obtain bony union, which at the best is of questionable utility?

While bony union, obtained by wiring, may be the goal for which the idealist strives, I question whether it can ever be conscientiously adopted by conservative surgeons.



